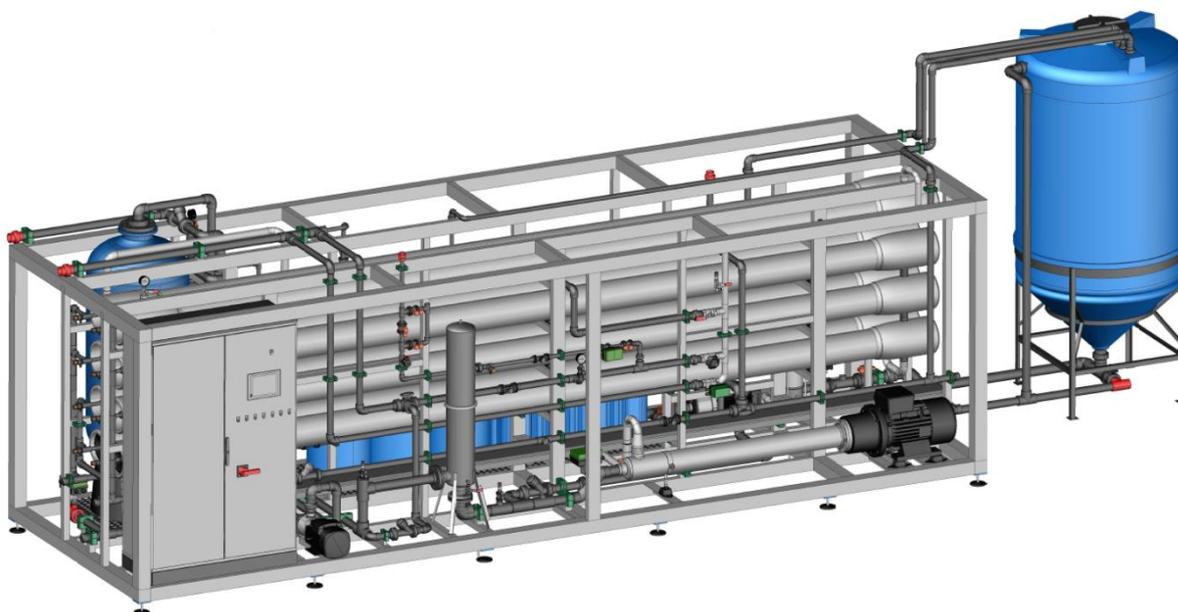


PLANT / MACHINE  
USE AND MAINTENANCE MANUAL



WATER TREATMENT PLANT  
RO DOUBLE PASS 8000 44 8  
Serial N° 220034 (4798)

**Uffici – Produzione – Sede legale**

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<b>DATA SYSTEM</b>	RO Double Pass 8000 44 8
	Serial Number: 220034 (4798)
	Year of production: 2020
	Date of installation: _____ 2021

<b>MANUFACTURER DATA</b>	SIMPEC s.r.l.
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## 1 GENERAL INFORMATION

### 1.1 INTRODUCTION

- This manual provides the customer with all the information on the RO Double Pass 8000 44 8 system, and on the security rules related to it, as well as the operating and maintenance that allow you to use it properly, maintaining its efficiency over time.
- The use and maintenance manual is an integral part of the plant and should follow it even in the case of change of ownership, until decommissioning.
- The manual must be carefully preserved in an easily accessible place, known by the Installer, Operator and Qualified Technician, they should carefully read in order to have clear procedures for installation, run, maintenance and dangerous conditions to be avoided.
- If the manual is lost it is necessary to make a specific request to Simpec s.r.l. indicating data of the system shown on page 7 of this manual.

## **ATTENTION**

Improper use of the equipment and improper maintenance can cause damage to people and property.

The Operator and Qualified Technician must be familiar with all the provisions contained in this manual before using the equipment or perform maintenance.

The procedures in this manual are applicable to plants only when used for the uses permitted. In case of use to other uses or purposes, the customer automatically becomes liable for breach security of persons possibly involved in an accident and / or injury.

## **1.2 INDICATIONS TO CUSTOMER**

Unless otherwise specified in the contract conditions, the Customer must provide:

- Positioning system.
- Connection to the system operating tanks.
- Power supply to the control panel.
- Compressed air supply (if present).
- Water supply.
- Lifting and handling for installation works.

## **ATTENTION**

Simpec S.r.l. is completely relieved of responsibility for damage to people or property resulting by a defective "GROUNDING" or not complying with regulations in the country where the system is installed.

For the characteristics of supply and discharges, see paragraph 7

*TECHNICAL DATA*

### 1.3 SPARE PARTS

Simpec s.r.l. suggests to use only original spare parts that ensure full interchangeability with the materials used in the plant. The use of spare parts not approved by Simpec s.r.l. in the period of validity of the guarantee, will avoid warranties.

### 1.4 TECHNICAL ASSISTANCE

Requests for technical assistance should be sent to the

*Simpec s.r.l.*

*Via Galvani, 18*

*20834 Nova Milanese – MB –*

*Tel. +39 0362.912233 Fax. +39 0362.912224*

*e-mail: [info@simpec.it](mailto:info@simpec.it)*

### 1.5 UNAUTHORIZED MODIFICATIONS

No changes may be made to the system or its components without the written permission of the Simpec s.r.l.; unauthorized changes may involve changes of the original functions and will void the warranty on the entire supply.

## 1.6 SPECIFIC TERMINOLOGY

To improve the understanding of this manual uses the following terms:

◆ *OPERATOR – LEAD*

Person in charge of operating, adjusting, effect the routine maintenance and cleaning of the plant.

◆ *QUALIFIED PERSONNEL*

A technician , specially trained and qualified to perform extraordinary maintenance or repairs that require special knowledge of the systems, safety devices and methods of intervention.

◆ *AUTHORIZED QUALIFIED TECHNICAL SERVICE*

Technical Service *Simpec s.r.l.*

## 2 HANDLING AND TRANSPORT

The movement of the plant must be performed by qualified personnel through the use of means of adequate capacity (forklifts, cranes, etc.).

Before handling be sure to completely empty the tanks and unplug the system from the utilities and services (electricity, compressed air, pipes).

The plant can be lifted by acting on the lower chassis trying to place the weight in a balanced manner.

- |                           |                          |
|---------------------------|--------------------------|
| ⇒ Dry weight about        | 2750 Kg                  |
| ⇒ Weight in running about | Max 7000 Kg (Full tanks) |

### **ATTENTION**

For no reason you should do or anchor force on pipes or equipment installed on the system as this could cause structural failure

### **NOTE**

Lifting ropes have to be always used for lasting lifting operations, or in case of danger

### **ATTENTION**

Simpec s.r.l. is not responsible for damages caused to persons or to things by lifting systems different from those described above

### 3 INSTALLATION

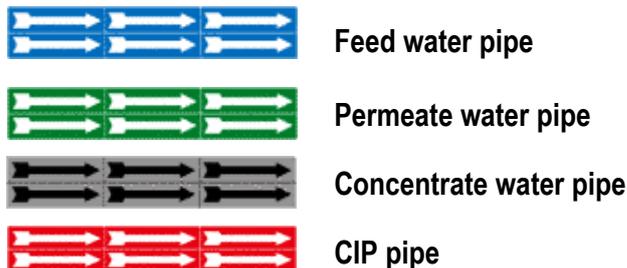
The installation of the system is limited to the following connections described in the following paragraphs.

#### 3.1 HYDRAULIC CONNECTIONS

The unit requires a series of hydraulic connections described below:

⇒ TP01 Feed water inlet	DN50 0,7 – 7 bar 0 – 40 °C
⇒ TP02 Fresh water inlet	DN50 0 – 3 bar 0 – 40 °C
⇒ TP03 Drain	DN50 Gravity 0 – 40 °C
⇒ TP04 Concentrate first pass outlet	DN25 0 – 4 bar 0 – 40 °C
⇒ TP05 Permeate second pass outlet	DN40 0 – 3 bar 0 – 40 °C
⇒ TP06 Concentrate second pass to TK07	DN50 0 – 4 bar 0 – 40 °C

Each pipe is identified with coloured arrow's stickers which indicates the type of that specific pipe. The legend is shown here below:



#### 3.2 PNEUMATIC CONNECTIONS

The unit requires no pneumatic connections

#### 3.3 ELECTRICAL CONNECTIONS

The plant requires a power supply with the following characteristics:

⇒ Voltage	400 V - 50 Hz - Three-phase + N + PE
⇒ Total installed power	64 kW
⇒ Average absorbed power	60 kW
⇒ Maximum absorbed power	60 kW

Inside the electrical control board are provided the appropriate terminals. The power supply is then distributed to the users according to the wiring diagrams attached to this manual.

A qualified electrician and a plumber with experience are able to perform the work in a workmanlike manner.

### **ATTENTION**

Before making the electrical connections, check that the supply voltage and frequency correspond to those indicated on the rating plate of the wiring diagram. Keep in mind that the plant needs a power supply 400 V - 50 Hz

Check that between the power line and the system has been placed a switch to isolate the machine from the rest of the system.

Check that the grounding is in accordance with current rules and that the section of power cables and external disconnect switch are dimensioned FOR EXPECTED MAXIMUM ABSORPTION .

For connection of the power cable to the terminals:

- I. L1 - L2 - L3 - N1 and GROUNDING mounted inside the power panel
- II. After this, you need CHECK THE ROTATION OF MOTORS.

## **3.4 CHECKING THE MOTORS ROTATION**

When the plant is in manual operation it is sufficient to switch on for a second the motor of a pump and observe the rotation direction of the rear fan

This has to match with the indication on the motor.

In case this is contrary to the indication, it is necessary to change the feed cables inverting the two phases between them (i.e. invert the cable position in terminal L1 with terminal L2)

### **DANGER**

Before acting in the control board, be sure that the power has been removed before the intervention.

## 4 NOTES ON SAFETY

To identify safety messages included in this manual the below terminologies have been used:

### **DANGER**

This term has been used in the safety messages in this manual and on the plates when serious injury or death can occur if the hazard is not avoided.

These safety messages are described as normal precautions to avoid danger.

In case these cautions are ignored serious damages to equipment can occur.

### **ATTENTION**

This term has been used in the safety messages in this manual and on the plates for hazards which, if not avoided, may result in minor or moderate injury and / or damage.

The message can also be used for hazards that can cause damage to plants.

### **IMPORTANT**

This term is used for precautions that should be taken to avoid operations which can shorten the "life" of the system.

### **NOTE**

This term is used to emphasize or provide information concerning the current operation.

If any procedure or action allowed for this system is put into practice, you can be sure that both the operator and the people around him can operate safely and without risk of harm to themselves or properties.

For any uncertainty regarding the safety, contact *Simpec s.r.l.*

## 4.1 SAFETY ON THE MACHINE

### 4.1.1 PASSIVE SAFETY

Safety regulations are in the design phase that protect the operator from electrical hazards or mechanical:

- Casing of electromechanical equipment.
- Protection class IP55 (minimum) of all electrical equipment.
- Use of low-voltage electrical components.
- Shut-off valves to isolate each component of the system and prevent spills.
- Oversizing of the resistance of some components compared to the pressures of real use.

### 4.1.2 RESIDUAL RISKS

The plant operates with pipes under pressure; when approaching is therefore necessary to wear the necessary protective clothing and especially goggles.

For any type of maintenance it becomes necessary, it is advisable to proceed first with a rinse of the pipes and with a more thorough rinsing of the part under maintenance.

In case of leakage, particularly if under pressure, it is necessary to approach the plant carefully and properly secured.



### 4.1.3 RISK TO THE ENVIRONMENT

Evaluated the mode of operation of the system and the way of disposing its waste, it is not considered that there are risks to the environment.

### 4.1.4 NOISE

*Simpec s.r.l.* declares that the sound pressure level produced by the plant is less than 87 dB (A) measured at 1.5 m from the electrical control panel and 1.5 m from the ground.

## 5 INTRODUCTION

### 5.1 PERMITTED USES

The plant was designed for the industrial water treatment

The system must work in the workplace protected from the weather, and in temperatures between +5 ° C and +40 ° C. (For different operating conditions, contact the technical department of *Simpec s.r.l.*)

#### **DANGER**

The plant was specifically conceived and designed to treat primary water.

Therefore, any other solution can cause damage to the plant, so it is necessary to deal with this plant only with the provided solution.

If you need to replace the original solution is advisable to contact the Technical Department of *Simpec s.r.l.*

### 5.2 OPERATOR WORKING POSITION

The use of the system must be specifically effected by authorized personnel who have received appropriate training in the use of the system and residual risks of the same.

Said staff will not necessarily maintain a specific position with respect to the system even if the optimal position, to control all stages of the work cycle or washing, is in front of the control panel.

## 6 PLANT GENERAL INDICATIONS

The plant consists in a unit assembled in an AISI 304 skid.

The control board has an IP 55 protection degree.

The plant critical elements are provided with safety systems and signals of the emergencies and the cause of them.

The main process parameters (temperatures, pressures, flow rates) are displayed in special instruments and in panel view installed in control board, which give a complete *check-up* of the plant operation at any time.

The parts subject to maintenance are easily accessible.



## 7.4 MATERIALS

Pumps:	AISI 316
Skid :	AISI 304
Tank:	PP
Filter:	AISI 316
Pipes and connections	AISI 316 / PVC
Housing membrane:	FRP
Valves:	AISI 316 / PVC
Membranes:	TFC

## 8 SET-POINTS

### 8.1 PRESSURE

<i>VARIABLE</i>	<i>PSL</i>	<i>PSH</i>
<i>PIT004</i>	<i>0,7</i>	<i>/</i>
<i>PIT005</i>	<i>/</i>	<i>75</i>
<i>PIT010</i>	<i>/</i>	<i>14</i>
<i>DELTA CF01</i>	<i>/</i>	<i>1</i>
<i>DELTA FIRST PASS</i>	<i>/</i>	<i>15</i>
<i>DELTA SECOND PASS</i>	<i>/</i>	<i>5</i>

Pressures are expressed in bar

### 8.2 TEMPERATURE

<i>VARIABLE</i>	<i>TSL</i>	<i>TSH</i>
<i>TIT 001</i>	<i>/</i>	<i>38</i>
<i>TIT 002</i>	<i>/</i>	<i>38</i>

Temperature is expressed in °C

## 8.3 TIMERS

### 8.3.1 TP700 FIRST PASS

TIMER	VARIABLE	Set-Point	Minimum	Maximum
T1	P02 PUMP STOP DELAY	60 sec	40 sec	90 sec
T2	P01 PUMP STOP DELAY	5 sec	5 sec	15 sec
T3	2AV01 INLET VALVE CLOSE DELAY	30 sec	30 sec	60 sec
T4	P01 FEED PUMP START DELAY	35 sec	25 sec	60 sec
T5	P02 HIGH PRESSURE PUMP START DELAY	40 sec	30 sec	60 sec
T6	2AV03 VALVE CLOSE DELAY	10 sec	5 sec	15 sec
T7	P03 FLUSHING PUMP START DELAY	120 sec	60 sec	180 sec
	P02 DECELERATION TIME	50 sec	30 sec	SET T1
T8	PIT004 FEED WATER LOW PRESSURE ALARM	60 sec	45 sec	120 sec
T9	TIT001 FEED WATER HIGH TEMPERATURE ALARM	120 sec	90 sec	300 sec
T10	FIRST PASS MEMBRANE HIGH DELTA PRESSURE ALARM	300 sec	180 sec	600 sec
T11	FIT002 FIRST PASS PERMEATE FLOW ALARM	120 sec	90 sec	300 sec
T12	FIT003 FIRST PASS CONCENTRATE FLOW ALARM	120 sec	90 sec	300 sec
T13	FIT004 FIRST PASS RECYCLE FLOW ALARM	120 sec	90 sec	300 sec
T14	AIT001 FEED WATER pH ALARM	120 sec	90 sec	300 sec
T15	AIT002 PERMEATE HIGH CONDUCTIVITY ALARM	120 sec	90 sec	300 sec
T16	AIT003 CONCENTRATE WATER pH ALARM	120 sec	90 sec	300 sec
T17	PIT005 MEMBRANE INLET HIGH PRESSURE ALARM	120 sec	90 sec	300 sec
T18	CF01 FILTER HIGH PRESSURE DELTA ALARM	60 sec	50 sec	120 sec
T34	TOTAL CLEANING TIME	3600 sec	1800 sec	4800 sec
T35	CLEANING WORK TIME	1800 sec	900 sec	2400 sec
T36	CLEANING PAUSE TIME	600 sec	0 sec	1200 sec

**NOTE** These times are adjustable through the PANEL VIEW as indicated in paragraph 9.2

### 8.3.2 TP700 SECOND PASS

<b>TIMER</b>	<b>VARIABLE</b>	<b>Set-Point</b>	<b>Minimum</b>	<b>Maximum</b>
T20	P04 PUMP STOP DELAY	50 sec	30 sec	90 sec
T21	P04 PUMP START DELAY	35 sec	30 sec	60 sec
T23	PIT010 MEMBRANE INLET PRESSURE ALARM DELAY	60 sec	30 sec	90 sec
T24	PIT013 PERMEATE HIGH PRESSURE ALARM DELAY	30 sec	30 sec	120 sec
T25	TIT002 FEED WATER HIGH TEMPERATURE ALARM DELAY	120 sec	90 sec	300 sec
T26	SECOND PASS MEMBRANE HIGH PRESSURE DELTA ALARM DELAY	120 sec	90 sec	300 sec
T27	FIT005 SECOND PASS PERMEATE FLOW ALARM DELAY	600 sec	300 sec	900 sec
T28	FIT006 SECOND PASS CONCENTRATE FLOW ALARM DELAY	600 sec	300 sec	900 sec
T29	FIT007 SECOND PASS RECYCLE FLOW ALARM DELAY	600 sec	300 sec	900 sec
T30	AIT004 PERMEATE HIGH CONDUCTIVITY ALARM DELAY	60 sec	30 sec	120 sec
T41	P04 DECELERATION TIME	45 sec	25 sec	SET T20
T34	TOTAL CLEANING TIME	3600 sec	1800 sec	4800 sec
T35	CLEANING WORK TIME	1800 sec	900 sec	2400 sec
T36	CLEANING PAUSE TIME	600 sec	0 sec	1200 sec

**NOTE** These times are adjustable through the PANEL VIEW as indicated in paragraph 9.2

## 8.4 OPERATING CONDITIONS

With a feed water of about \_\_\_\_\_ TDS ( \_\_\_\_\_  $\mu\text{S}$ )

N°	TAG	Parameter	Limit/set	Standard Value
1	PI001	MMF01 INLET PRESSURE		2 - 5 bar
2	PI002	BACKWASH INLET PRESSURE		2 - 5 bar
3	PIT003	CF01 INLET PRESSURE		2 - 5 bar
4	PIT004	CF01 OUTLET PRESSURE		2 - 5 bar
5	PIT005	FIRST PASS MEMBRANES INLET PRESSURE		40 – 70 bar
6	PI006	PV01 OUTLET PRESSURE		40 – 70 bar
7	PI007	PV06 INLET PRESSURE		40 – 70 bar
8	PIT008	FIRST PASS MEMBRANES OUTLET PRESSURE		40 – 70 bar
9	PI009	FIRST PASS RECYCLE PRESSURE		2 - 5 bar
10	PIT010	SECOND PASS MEMBRANES INLET PRESSURE		7 – 15 bar
11	PI011	SECOND PASS RECYCLE PRESSURE		2 - 5 bar
12	PIT012	SECOND PASS MEMBRANES OUTLET PRESSURE		7 – 15 bar
13	PIT013	SECOND PASS PERMEATE PRESSURE		0 – 3 bar
14	AIT001	FEED WATER pH		3 – 10 pH
15	AIT002	FIRST PASS PERMEATE CONDUCTIVITY		< 1000 $\mu\text{S}$
16	AIT003	FIRST PASS CONCENTRATE pH		3 – 10 pH
17	AIT004	SECOND PASS PERMEATE CONDUCTIVITY		< 100 $\mu\text{S}$
18	FI001	MMF01 OUTLET FLOW		10 m <sup>3</sup> /h
19	FIT002	FIRST PASS PERMEATE FLOW		7,5 m <sup>3</sup> /h
20	FIT003	FIRST PASS CONCENTRATE FLOW		2,5 m <sup>3</sup> /h

21	FIT004	FIRST PASS RECYCLE FLOW		8 m <sup>3</sup> /h
22	FIT005	SECOND PASS PERMEATE FLOW		6,7 m <sup>3</sup> /h
23	FIT006	SECOND PASS CONCENTRATE FLOW		0,8 m <sup>3</sup> /h
24	FIT007	SECOND PASS RECYCLE FLOW		4 m <sup>3</sup> /h
25	TIT001	FIRST PASS FEED TEMPERATURE		10 - 35 °C
26	TIT002	SECOND PASS FEED TEMPERATURE		10 - 35 °C

## 9 OPERATION DESCRIPTION

### 9.1 PROCESS SCHEME

#### 9.1.1 FIRST PASS

The inlet water, drew by means of pump P01 from tank TK03, is pre-filtered with a multimedia filter in order to remove eventual suspended solid substances (sand, rust, etc.).

The MMF01 filter inlet pressure is displayed in manometer PI001 and the backwash inlet pressure is displayed in manometer PI002.

In addition, the inlet water is added with two chemical products by means of two dosing pumps: PD01 pump which constantly dose the chemical must and; PD02 pump which doses proportionally to the read value of AIT001.

The inlet water is pre-filtered again by means of a cartridge filter CF01, then pressurized by means of a high pressure pump (P02), to reverse osmosis modules (RO 01 – RO 02 – RO 03 – RO 04 – RO 05 – RO 06) in which the treatment is performed.

The pressure sensor PIT003 displays the inlet pressure to CF01.

The pressure sensor PIT004 displays the outlet pressure from CF01.

The pressure sensor PIT005 displays the inlet pressure to RO modules.

The pressure sensor PIT008 displays the outlet pressure from RO modules.

From RO modules two flows are conveyed:

- A flow of soft water or permeate, whose flow rate is displayed in flow meter (FIT002) and whose characteristics are detected from conductivity probe (AIT002).
- A flow of concentrate water whose flow rate is displayed in flow meter (FIT003) and, automatically controlled by means of valve 2AV04.

A certain flow rate of concentrate water is conveyed back to reverse osmosis membranes inlet. Through the PD03 dosing pump and the AIT003 sensor, the pH of the concentrate is corrected by dosing the necessary chemical product

### **9.1.2 SECOND PASS**

The water is drawn in and pressurized by means of a high pressure pump (P04), to reverse osmosis modules (RO 07 – RO 08) in which the treatment is performed.

The manometer PIT010 displays the inlet pressure to RO modules.

The manometer PIT012 displays the outlet pressure from RO modules.

From RO modules two flows are conveyed:

- A flow of soft water or permeate, whose flow rate is displayed in flow meter (FIT005) and whose characteristics are detected from conductivity probe (AIT004)
- A flow of concentrate water whose flow rate is displayed in flow meter FIT006 and automatically controlled by means of valve 2AV06.

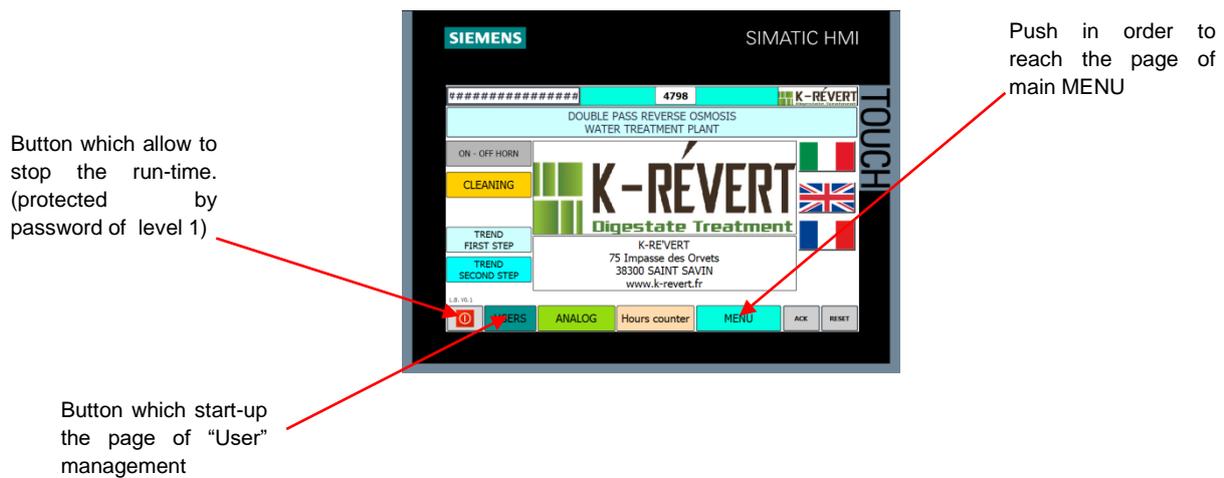
A certain flow rate of concentrate water is conveyed back to the break tank TK16. The flow rate is displayed in flow meter FIT007.

## 9.2 POWER

The plant is controlled by means of a PLC. In front of the control board there is a HMI in order to set the temporal values, to operate manually or automatically the plant, to display the information messages, to display the alarms and the operational parameters of the plant.

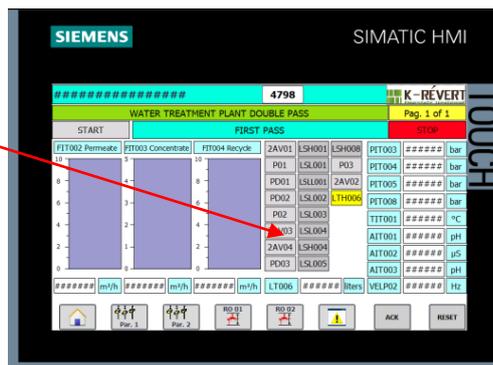
In this manual there are information for the device use and for the parameterization of program variables. The images in the manual can divert from the images really present in the plant.

The first display in the control board is:



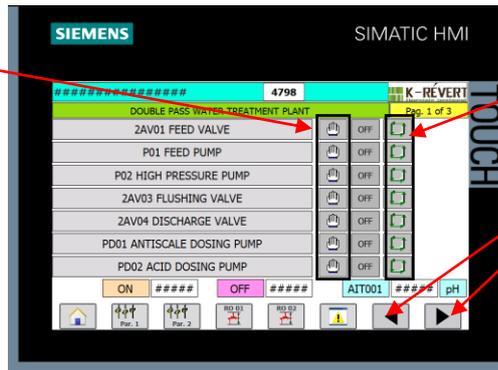
Press the button MENU. The screen which appears is the following :

Press in correspondence of users in order to start-up the page relevant the users choice.



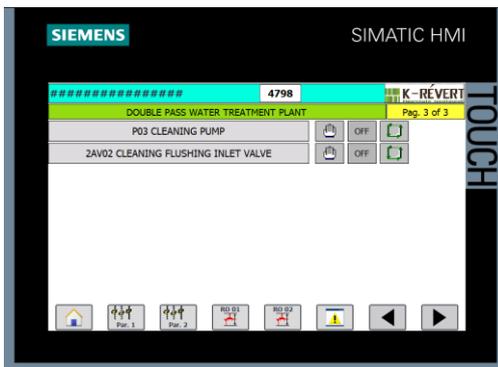
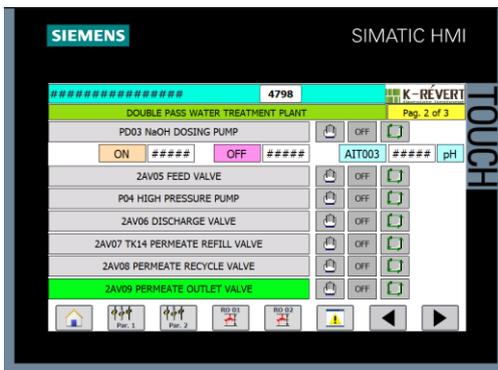
The screen which appears for the choice of operating mode of every single users is the following:

Buttons which set up the users in manual mode



Buttons which set up the users in automatic mode

Buttons for the pages change



Select the users which have to operate in automatic mode.

Press "Exit" or "K-REVERT" in order to display the main page

**NOTE** The minimum configuration in order to start up the plant is :

**FIRST PASS**

Feed valve 2AV01 in "AUTOMATIC"

Concentrate valve 2AV03 in "AUTOMATIC"

Concentrate control valve 2AV04 in "AUTOMATIC"

Feed pump P01 in "AUTOMATIC" - High pressure pump P02 in "AUTOMATIC"

## SECOND PASS

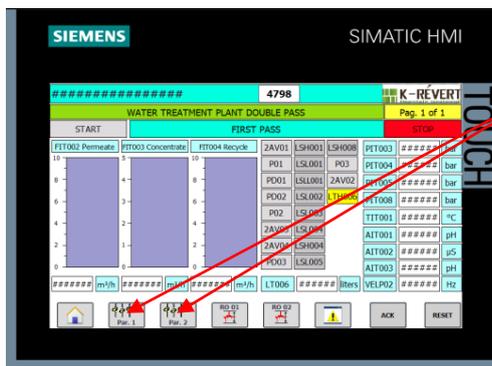
Feed Valve 2AV05 in "AUTOMATIC"

High pressure pump P04 in "AUTOMATIC"

Concentrate control valve 2AV06 in "AUTOMATIC" - Permeate valve 2AV09 in "AUTOMATIC"

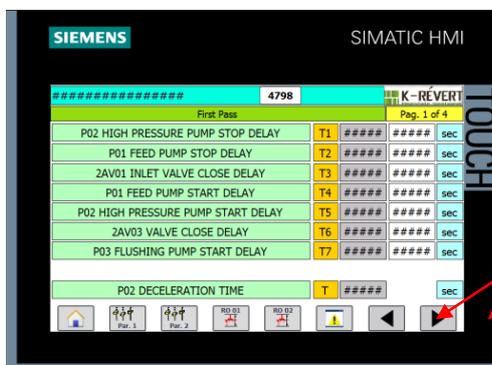
### 9.2.1 SET TIMERS AND ALARMS

Press in "Par." in order to display the relevant setting pages



Buttons which start up the relevant pages

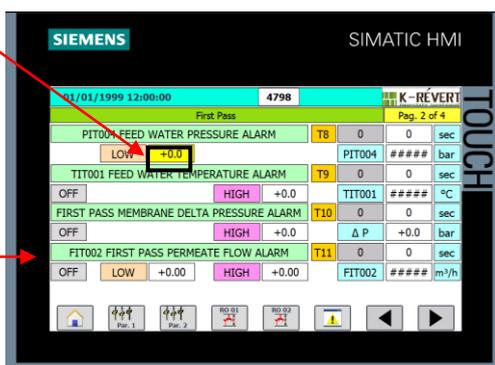
The first screen that appears for Par.1 is the following:



Buttons for the page change

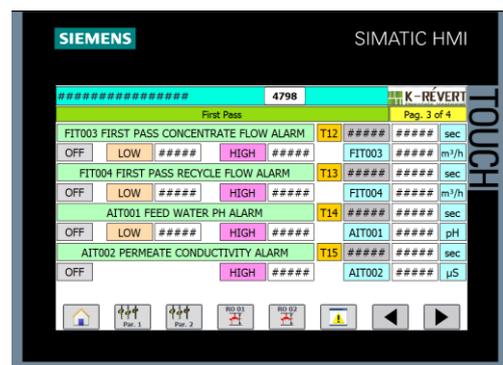
Page 1

Variable of set :  
press in order to  
modify the value

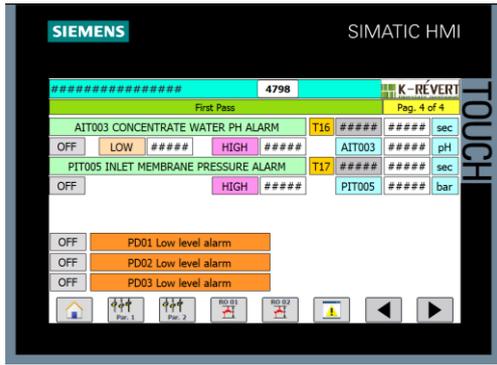


Button which enables or not the relevant alarm

Page 2

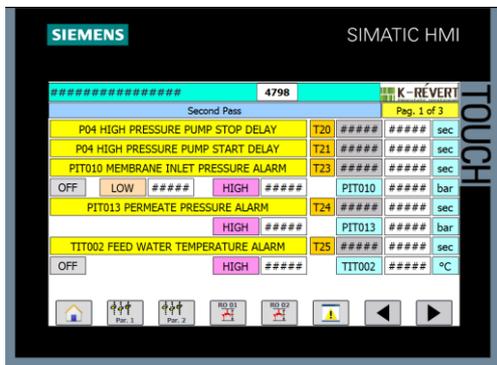


Page 3

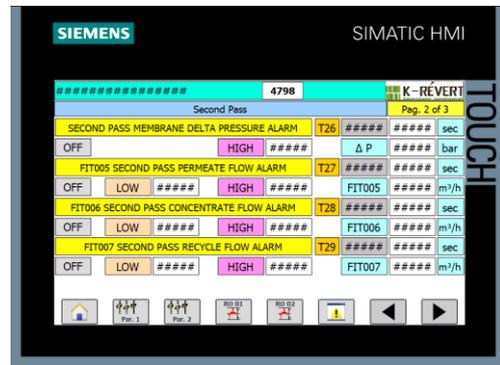


Page 4

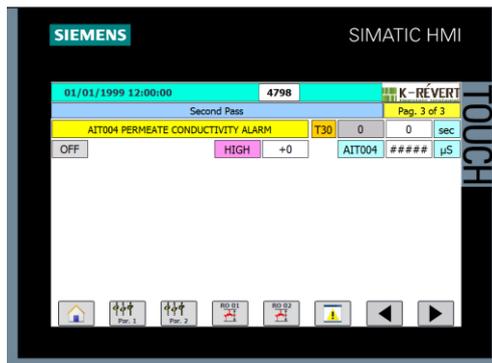
**Second pass parameters (Par. 2):**



Page 1



Page 2



Page 3

## 10 SET-POINTS

### 10.1 ALARM VALUES SETTING IN FACTORY

#### 10.1.1 REVERSE OSMOSIS FIRST PASS

N°	TAG	Parameter	Low Set Point	High Set Point
1	PIT003	MMF01 OUTLET PRESSURE	0,7 bar	/
2	PIT004	CF01 OUTLET PRESSURE	0,7 bar	/
3	PIT005	FIRST PASS MEMBRANES INLET PRESSURE	/	75 bar
4	PIT003/PIT004	CF01 PRESSURE DELTA	/	1 bar
5	PIT005/PIT008	MEMBRANES PRESSURE DELTA	/	15 bar
6	AIT001	FEED WATER pH	2 pH	11 pH
7	AIT002	FIRST PASS PERMEATE CONDUCTIVITY	/	1700 $\mu$ S
8	AIT003	FIRST PASS CONCENTRATE pH	2 pH	11 pH
9	FIT002	FIRST PASS PERMEATE FLOW	5 m <sup>3</sup> /h	9 m <sup>3</sup> /h
10	FIT003	FIRST PASS CONCENTRATE FLOW	1,5 m <sup>3</sup> /h	3 m <sup>3</sup> /h
12	FIT004	FIRST PASS RECYCLE FLOW	6 m <sup>3</sup> /h	10 m <sup>3</sup> /h
13	TIT001	FIRST PASS FEED TEMPERATURE	/	38 °C

#### 10.1.2 REVERSE OSMOSIS SECOND PASS

	TAG	Parameter	Low	Set	High Set Point
1	PIT010	SECOND PASS MEMBRANES INLET PRESSURE	/		14 bar
2	PIT013	SECOND PASS PERMEATE PRESSURE	/		5 bar
3	PIT010/PIT012	SECOND PASS MEMBRANES PRESSURE DELTA	/		5 bar
4	AIT004	SECOND PASS PERMEATE CONDUCTIVITY	/		200 $\mu$ S
5	FIT005	SECOND PASS PERMEATE FLOW	4 m <sup>3</sup> /h		8 m <sup>3</sup> /h
6	FIT006	SECOND PASS CONCENTRATE FLOW	0,3 m <sup>3</sup> /h		1,5 m <sup>3</sup> /h
7	FIT007	SECOND PASS RECYCLE FLOW	2 m <sup>3</sup> /h		6 m <sup>3</sup> /h
8	TIT002	SECOND PASS FEED TEMPERATURE	/		38 °C

## 10.2 DOSING PUMP SET – POINT IN FACTORY

N°	TAG	Description	Set Point ON	Set Point OFF
1	PD02	ACID FEED FIRST PASS DOSING	AIT001 pH SET	AIT001 pH SET
2	PD03	NaOH FIRST PASS CONCENTRATE DOSING	AIT003 pH SET	AIT003 pH SET

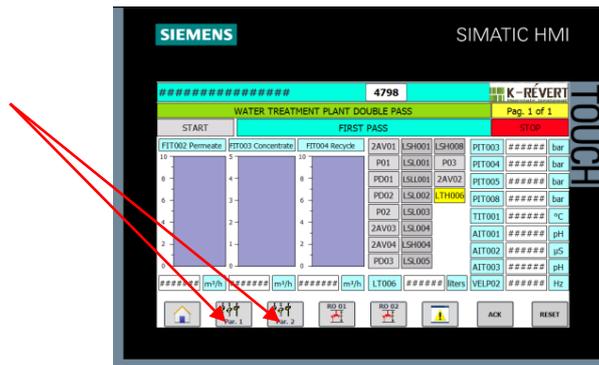
### 10.2.1 SET TIMERS

SET THE TIMES NECESSARY FOR THE CORRECT PLANT OPERATION.

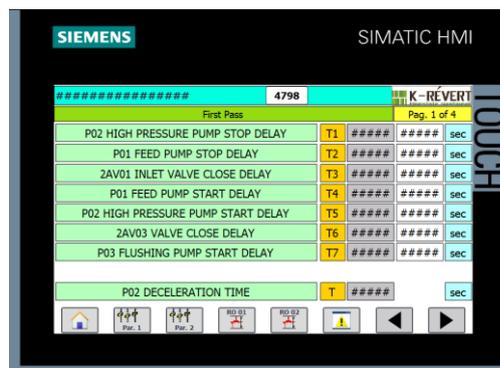
Press in "Par. 1" in order to display the pages relevant the times of first pass.

Press in "Par. 2" in order to display the pages relevant the times of second pass.

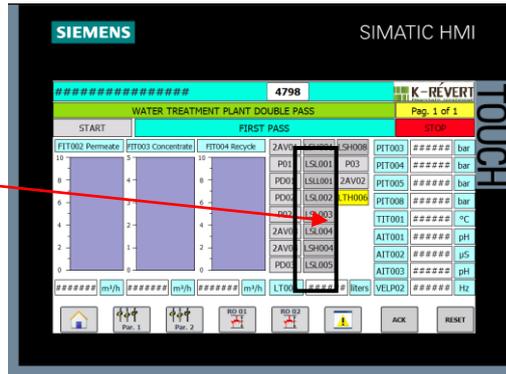
Button which start-up the relevant pages of times .



The first screen which appears is the following:

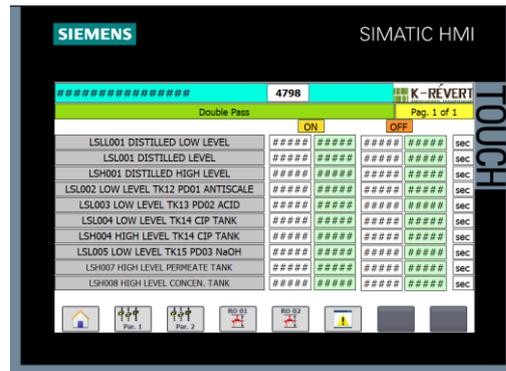


Set all the times, keeping into the consideration the values described in 8.3.



Button which starts up the relevant pages of times.

In this screen the delay times, in opening and closing of all levels connected to the plant, are displayed. Modify them according to your requirements .

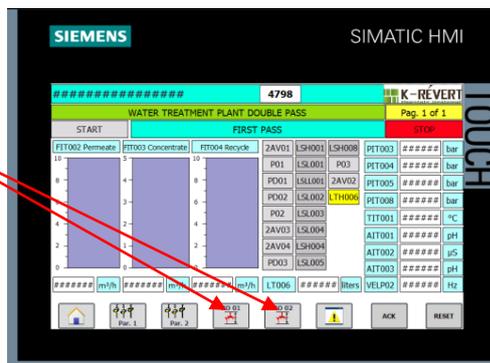


Press "Exit" in order to display the opening page.

Press in "Var. 1" in order to display the pages relevant the variable of first pass.

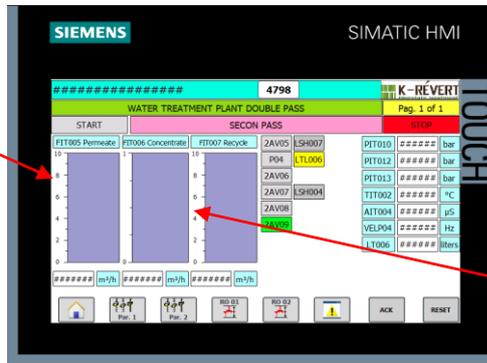
Press in "Var. 2" in order to display the pages relevant the variable of second pass.

Button which start-up the informative page



The displayed page is the following:

Permeate water flow. Button which start-up the informative and setting page

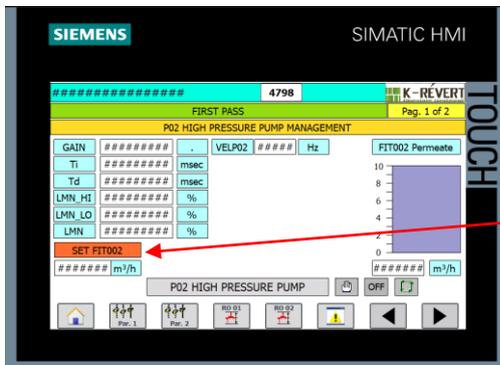


Concentrate water flow Button which start-up the informative and setting page

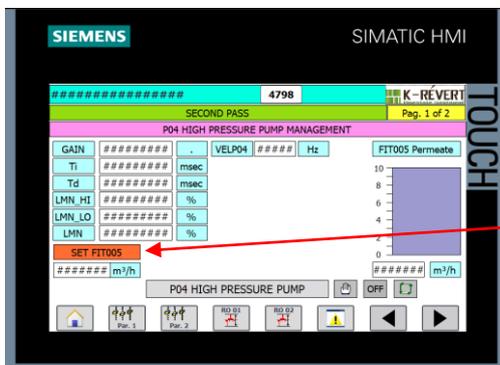
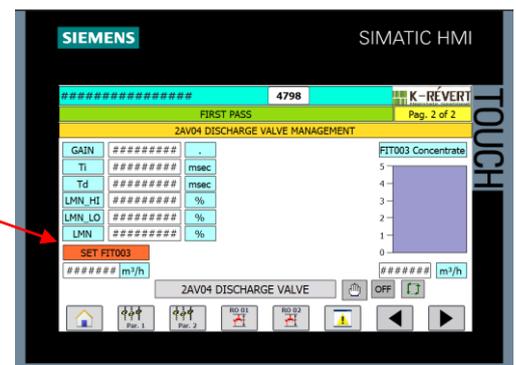
Press on permeate bar - graph for setting the relative flow.

Press on concentrate bar - graph for setting the relative flow.

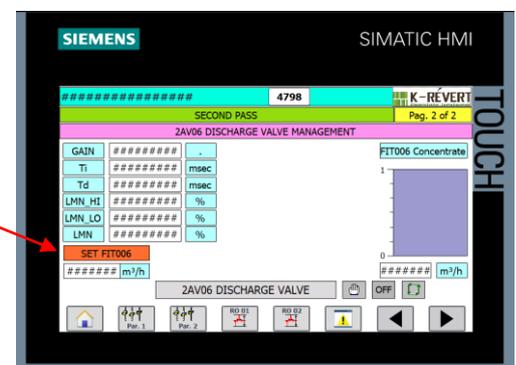
The displayed page is the following:



Set the required flow values



Set the required flow value



After performing all these operations it's possible to start up the plant.

Press "Exit" or "K-REVERT" in order to display the main page.

Some operations are protected by password.

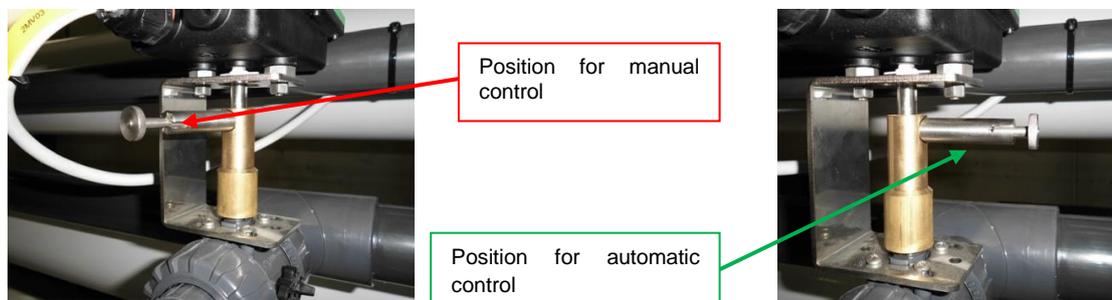
The users authorized to modifications are:

NAME: simpec

PASSWORD = 0362 (Default)

### 10.2.2 FIRST PASS START UP

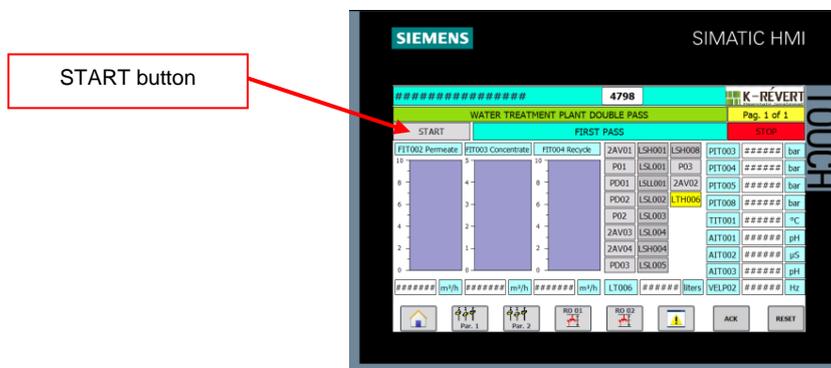
- Close the manual valves MV04, MV06, MV08, MV09, MV15, MV18, MV19, MV28, MV29, MV31, MV35.
- Check that all PC test intake valves are closed.
- Open the manual valves MV01, MV02, MV03, MV05, MV07, MV10, MV11, MV12, MV13, MV14, MV16, MV17, MV20, MV21, MV22, MV23, MV24, MV25, MV26, MV27, MV30, MV32, MV33, MV34, MV36.
- Check the correct position of manual valve 3MV01 and 3MV02.
- Check that all automatic valves have the servocontrol engaged.



- At the first start up, regulate the manual valve RV01.
- Power the control board by means of main switch IG1.
- Wait for the Panel View start up.
- Set the alarms and timers as indicated in previous chapter.
- Prepare the dosing solutions in TK02, TK03 and TK06 according to the enclosed Data Sheets of chemical products and to the following List:

N°	TAG	Description	Product	Consumption	Note
1	PD01	Product dosed in order to condition the feed water	ANTISCALE	50 g/h not diluted	
1	PD02	Product dosed in order to condition the feed water	ACID	Depending on the feed pH	
2	PD03	Product dosed in order to condition the concentrate water	NaOH	Depending on the concentrate pH	

- Select and set the users for which for automatic operation is required  
(It is advisable to set all the utilities in AUTOMATIC).
- In main page press START



At this point:

With the LT006 set point consent, LS01 and LSH008 consent, and with the operator's manual start, the first pass start-up cycle begins, vice versa the "STAND-BY" message appears.

- The automatic valve 2AV01 opens.
- After a T1 time, the P01 feed pump starts.
- After a T2 time, the high pressure pump P02 starts.
- If in automatic and with its low level consent (LSL002), The PD01 dosing pump starts to dose the chemical product.
- The PD02 dosing pump, if in automatic, with its low level consent (LSL003) and if the correct AIT001 pH set-point is reached, starts to dose the chemical product.
- After a T6 time the 2AV02 valve closes and the 2AV04 valve opens.
- The PD03 dosing pump, if in automatic, with its low level consent (LSL005) and if the correct AIT003 pH set-point is reached, starts to dose the chemical product.

Lacking one of the minimum conditions mentioned above, the plants performs its stopping procedure:

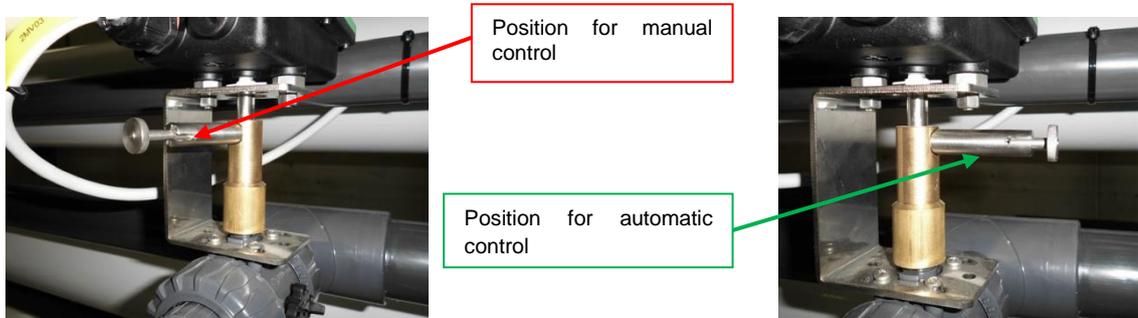
- The PD03 dosing pump stops
- The 2AV04 valve closes and the 2AV02 valve opens.
- The PD01 and PD02 dosing pumps stop.

- With a T1 delay and with a T deceleration time, the P02 high pressure pump stops.
- After a T2 time, the P01 pump stops.
- After a T3 time the 2AV01 feed valve closes.

With the 2AV02 and 2AV03 valves in automatic, the P03 pump in automatic and the LSL004 level consent, the P03 pump starts up and the 2AV02 valve opens to flush the plant after each stop.

### 10.2.3 SECOND PASS START UP

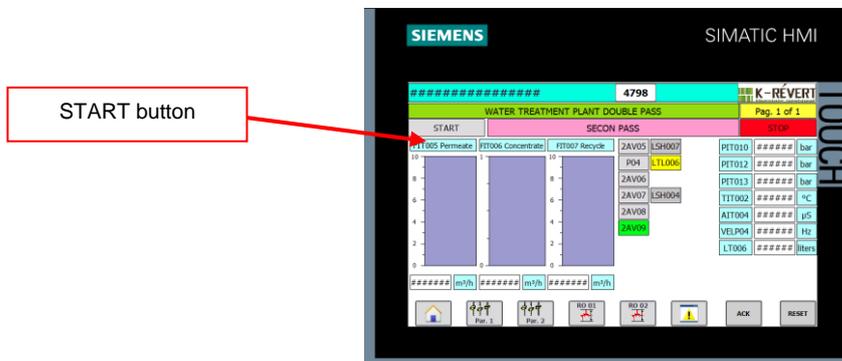
- Close the manual valves MV37, MV40.
- Check that the PC test intake valves are closed.
- Open the manual valve MV38, MV39, MV41, MV42.
- Check that all automatic valves have the servocontrol engaged.



- At the first start up, regulate the manual valve RV02 and RV03.
- Give power the control board by means of the main switch IG1.
- Wait for the Panel View start up.
- Set all alarms and timers as described in previous chapter.
- Select and set the users for which the automatic operation is required.

(It is advisable to set the utilities in AUTOMATIC).

- In main page press START



At this point:

With the LT006 set point consent and LSH007 consent, and with the operator's manual start, the first pass start-up cycle begins, vice versa the "STAND-BY" message appears.

- The automatic valve 2AV05 opens.
- After a T21 time, the P04 pump starts.
- After 25 seconds, the 2AV08 valve closes and the 2AV09 valve opens.
- If in automatic and with the correct AIT004 set reached, after 30 seconds the 2AV07 valve opens to fill the TK04 tank with permeate until its maximum level LSH004 is reached.

Lacking one of the minimum conditions mentioned above, the plants performs its stopping procedure:

- The 2AV09 valve closes and the 2AV08 valve opens.
- With a T20 delay, the P04 pump stops.
- The 2AV05 valve closes.

With the 2AV02 and 2AV03 valves in automatic, the P03 pump in automatic and the LSL004 level consent, the P03 pump starts up and the 2AV02 valve opens to flush the plant's first pass after each stop.

## 11 GENERAL PRECAUTIONS AND MAINTENANCE

### 11.1 GENERAL RULES

The system must be used exclusively by qualified, trained and licensed personnel. Before using, the system Operators must be certain that they have:

- Read this entire publication
- Understood the functions of various organs and have a clear understanding of the positions of controls and their function
- Fully respected the precautions contained in this manual

### 11.2 CLOTHING AND PERSONAL PROTECTIVE EQUIPMENT

#### **DANGER**

The Workers in the plant must use personal protection devices required by EEC directives (goggles, gloves, gowns, shoes etc..) and the regulations for the protection of health and of the person, above all in consideration of the fact that, in the plant, chemical products as detergents and preservatives are used and that they can harm the operator health.

In case the operator comes into contact with chemical products, it is necessary to refer to technical and safety sheets of the used products, enclosed to this manual.

Refer to safety sheets requesting them to the suppliers.

## 11.3 MAINTENANCE PRECAUTIONS

The maintenance of plant equipment must be performed by qualified authorized technicians, they should be familiar with what is shown in this manual.

The Qualified technicians must take all necessary means and precautions necessary for the protection of health and of the people; specifically, the clothing must comply with the essential safety requirements in force in the country where the machine is installed.

Before servicing, the qualified technician must exclude all power (electrical, hydraulic and pneumatic) and affix signs that indicate that the plant is being maintained.

During maintenance should be denied entrance to the system of all unauthorized personnel.

## 11.4 ROUTINE MAINTENANCE

### 11.4.1 LEVELS CLEANING AND CHECK

#### 11.4.1.1 *Shaft and floating levels*

Every now and then it is advisable to check that the shaft of level sensors are clean in order to prevent problems in the level reading with eventual liquid leaks, not reported anomalies and malfunctions of the plant.

## 11.5 NON ROUTINE MAINTENANCE

### 11.5.1 PUMPS

For these operations refer to the manual operation of pumps manufacturer. Pls. find in annex a copy of this manual

### 11.5.2 PRESSURE TRANSMITTER

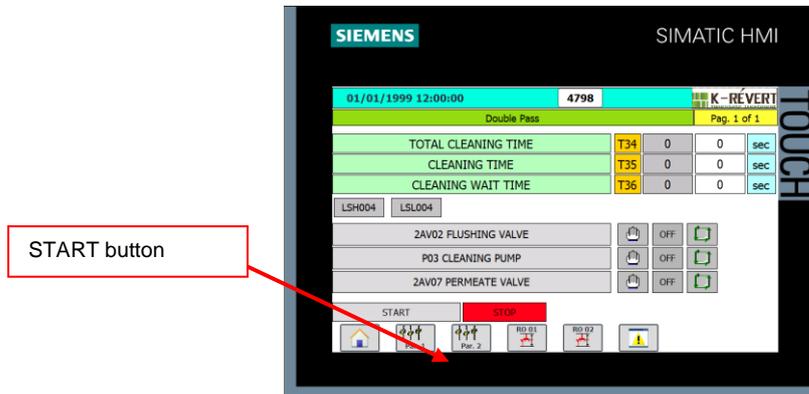
For these operations refer to the manual operation of manufacturer. Pls. find in annex a copy of this manual

### 11.5.3 CHEMICAL CLEANING OF FIRST PASS MEMBRANES

The cleaning has to be performed when an important decrease in permeate flow rate is noticed.

- 1) If the plant is in operation, press the button STOP in the start-up screen
- 2) Wait that the pumps and motorized valves stop
- 3) Close the manual valves RV01, MV31
- 4) Open the manual valves MV29, MV30

- 5) Rotate the manual valve 3MV02
- 6) Prepare the cleaning solution in the tank TK14
- 7) Press the manual selector in the relevant page



**The module cleaning is performed**

- 8) Stop the cleaning pressing the STOP button
- 9) Open MV31 if the solution in TK14 drainage is required.

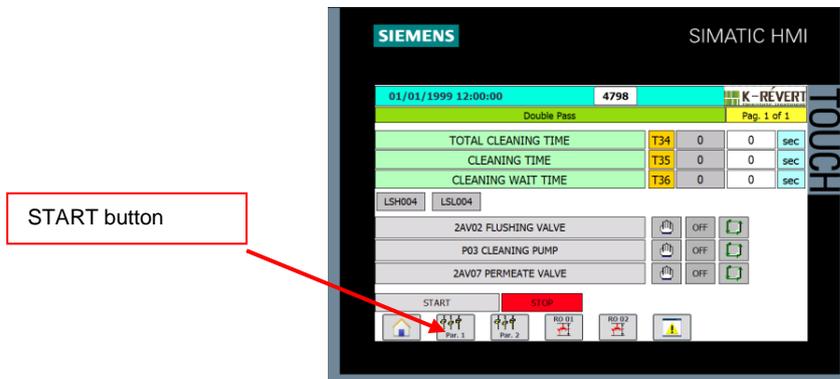
In order to start up the plant refer to the indications **in point 9.0**

#### 10.5.4 CHEMICAL CLEANING OF SECOND PASS MEMBRANES

The cleaning has to be performed when an important decrease in permeate flow rate is noticed .

- 1) If the plant is in operation, press the button STOP in the screen relevant the start-up
- 2) Wait that the pumps and motorized valves stop
- 3) Close the manual valves MV31, RV02, RV03
- 4) Open the manual valves MV39, MV40.

- 5) Prepare the cleaning solution in the tank TK14
- 6) Press the manual selector in the relevant page



**The module cleaning is performed**

- 7) Stop the cleaning pressing the STOP button
- 8) Open MV31 if the solution in TK05 drainage is required.

In order to start up the plant refer to the indications **in point 9.0**

**NOTE** – With the same procedure it is possible to execute the **plant disinfection** before a long stop of the unit (at least 1 month). Use suitable products for membranes disinfection.

#### 11.5.4 MEMBRANES REPLACEMENT

When, in spite of the cleaning, the flow and quality of permeate are insufficient, it is necessary to replace membranes.

In order to perform this operation contact the plant manufacturer. This operation has to be executed only from skilled technicians.

## 12 PLANT SHUT DOWN

Two types of plant shut down have to be considered according to the stop time

### 12.1 SHORT STOP

For short time stops (up to max. 7 days) it is sufficient to press the button “STOP”.

### 12.2 LONG STOP

For long time stops (longer than 7 days) it is necessary to:

- Perform a membrane cleaning and disinfection cycle

## **13 SIGNALS**

### **13.1 ELECTRICAL SIGNALS**

#### **13.1.1 POWER**

White signal which indicates the power presence in control board

#### **13.1.2 AUXILIARY ON**

White signal which indicates the auxiliary status

### **13.2 ALARMS**

#### **13.2.1 A1 PIT004 FEED LOW PRESSURE**

Alarm which indicates the feed minimum pressure set intervention (PIT004)

The plant stops in emergency.

When this signal appears, it is necessary to:

- ⇒ Check that there isn't any leakage in feed line.
- ⇒ Check the correct valves' positioning
- ⇒ Check the filtering cartridges' clogging degree.

#### **13.2.2 A2 TIT001 FIRST PASS HIGH TEMPERATURE**

Alarm which indicates the intervention for first pass feed high temperature (TIT001)

The plant stops in emergency.

When this signal appears, it is necessary to:

- ⇒ Check the correct functionality of probe TIT001
- ⇒ Check the cause of water's high temperature.

#### **13.2.3 A3 FIRST PASS DELTA PRESSURE ALARM**

Alarm which indicates the intervention of the pressure set which causes the plant shut down for an high pressure delta on reverse osmosis modules.

The plant stops in emergency.

When this signal appears, it is necessary to:

- ⇒ Check the flow rates and pressures' correct setting.

⇒ Check the membranes clogging degree and eventually execute a chemical cleaning.

#### **13.2.4 A4 FIRST PASS PERMEATE HIGH FLOW (FIT002)**

Alarm which indicates the intervention of FIT002 high permeate flow set.

The plant stops in emergency.

When this signal appears, it is necessary to:

- ⇒ Check the flow rates and pressures' correct setting
- ⇒ Check the P02 pump's correct operation.
- ⇒ Check the membranes' clogging degree and eventually execute a chemical cleaning

#### **13.2.5 A5 FIRST PASS PERMEATE LOW FLOW (FIT002)**

Alarm which indicates the intervention of FIT002 low permeate flow set.

The plant stops in emergency.

When this signal appears, it is necessary to:

- ⇒ Check the flow rates and pressures' correct setting
- ⇒ Check the P02 pump's correct operation.
- ⇒ Check the membranes' clogging degree and eventually execute a chemical cleaning

#### **13.2.6 A6 FIRST PASS CONCENTRATE HIGH FLOW (FIT003)**

Alarm which indicates the intervention of FIT003 high concentrate flow set.

The plant stops in emergency

When this signal appears, it is necessary to:

- ⇒ Check the flow rates and pressures' correct setting
- ⇒ Check the P02 pump's correct operation.
- ⇒ Check the membranes' clogging degree and eventually execute a chemical cleaning

#### **13.2.7 A7 FIRST PASS CONCENTRATE LOW FLOW (FIT003)**

Alarm which indicates the intervention of FIT003 low concentrate flow set.

The plant stops in emergency

When this signal appears, it is necessary to:

- ⇒ Check the flow rates and pressures' correct setting
- ⇒ Check the P02 pump's correct operation.
- ⇒ Check the membranes' clogging degree and eventually execute a chemical cleaning

### **13.2.8 A8 FIRST PASS RECYCLE HIGH FLOW (FIT004)**

Alarm which indicates the intervention of FIT004 high recycle flow set.

The plant stops in emergency

When this signal appears, it is necessary to:

- ⇒ Check the flow rates and pressures' correct setting.
- ⇒ Check the pumps' correct operation.
- ⇒ Check the valves' correct operation.

### **13.2.9 A9 FIRST PASS RECYCLE LOW FLOW (FIT004)**

Alarm which indicates the intervention of FIT004 low recycle flow set.

The plant stops in emergency

When this signal appears, it is necessary to:

- ⇒ Check the flow rates and pressures' correct setting.
- ⇒ Check the pumps' correct operation.
- ⇒ Check the valves' correct operation.

### **13.2.10 A10 AIT002 FIRST PASS PERMEATE HIGH CONDUCTIVITY**

Alarm which indicates the intervention for permeate high conductivity (AIT001)

The plant stops in emergency.

When this signal appears, it is necessary to:

- ⇒ Check the correct operation and calibration of probe AE002
- ⇒ Check the correct operation and calibration of instrument AIT002
- ⇒ Check the flow rates and pressures' correct setting
- ⇒ Check the membranes' clogging degree and eventually execute a chemical cleaning.

### **13.2.11 A11 FIRST PASS AUTOMATIC SELECTORS NOT IN AUTOMATIC POSITION**

When this signal appears, it is necessary to:

- ⇒ Check the position of the automatic utility selectors.

**NOTE** The minimum configuration in order to start up the plant is :

#### **FIRST PASS**

Feed valve 2AV01 in "AUTOMATIC"

Concentrate valve 2AV03 in "AUTOMATIC"

Concentrate control valve 2AV04 in "AUTOMATIC"

Feed pump P01 in "AUTOMATIC"

High pressure pump P02 in "AUTOMATIC"

### **13.2.12 A12 LSL003 PD02 DOSING PUMP LOW LEVEL**

Alarm which indicates the intervention of LSL003 low level switch.

The plant stops in emergency

When this signal appears, it is necessary to:

- ⇒ Refill TK03 tank with the correct solution.

### **13.2.13 A13 LSL002 PD01 DOSING PUMP LOW LEVEL**

Alarm which indicates the intervention of LSL002 low level switch.

The plant stops in emergency

When this signal appears, it is necessary to:

- ⇒ Refill TK02 tank with the correct solution.

### **13.2.14 A14 EMERGENCY**

Alarm which indicates the emergency button's intervention.

The system stops in emergency

When this signal appears, it is necessary to:

- ⇒ Check the position of the emergency button.
- ⇒ Check the position of the key auxiliary selector.

### **13.2.15 A15 PIT005 FIRST PASS MEMBRANE INLET HIGH PRESSURE**

Alarm which indicates the intervention of PIT005 high membrane's inlet pressure set.

The first pass stops in emergency

When this signal appears, it is necessary to:

- ⇒ Check the flow rates and pressures' correct setting.
- ⇒ Check the P02 pump's correct operation.
- ⇒ Check the valves' correct operation.

### **13.2.16 A16 AIT001 FIRST PASS FEED WATER HIGH PH**

Alarm which indicates the intervention for feed water high pH (AIT001)

The plant stops in emergency.

When this signal appears, it is necessary to:

- ⇒ Check the correct operation and calibration of probe AE001.
- ⇒ Check the correct operation and calibration of instrument AIT001.
- ⇒ Check the flow rates and pressures correct setting.
- ⇒ Check the valve's correct operation.
- ⇒ Check the PD02 dosing pump correct operation.

### **13.2.17 A17 AIT001 FIRST PASS FEED WATER LOW PH**

Alarm which indicates the intervention for feed water low pH (AIT001)

The plant stops in emergency.

When this signal appears, it is necessary to:

- ⇒ Check the correct operation and calibration of probe AE001.
- ⇒ Check the correct operation and calibration of instrument AIT001.
- ⇒ Check the flow rates and pressures correct setting.
- ⇒ Check the valve's correct operation.
- ⇒ Check the PD02 dosing pump correct operation.

### **13.2.18 A18 LSL006 PD03 DOSING PUMP LOW LEVEL**

Alarm which indicates the intervention of LSL006 low level switch.

The plant stops in emergency.

When this signal appears, it is necessary to:

- ⇒ Refill TK06 tank with the correct solution.

### **13.2.19 A19 AIT003 FIRST PASS CONCENTRATE WATER HIGH PH**

Alarm which indicates the intervention for concentrate water high pH (AIT003)

The plant stops in emergency.

When this signal appears, it is necessary to:

- ⇒ Check the correct operation and calibration of probe AE003.
- ⇒ Check the correct operation and calibration of instrument AIT003.
- ⇒ Check the flow rates and pressures correct setting.
- ⇒ Check the valve's correct operation.
- ⇒ Check the PD03 dosing pump correct operation.

### **13.2.20 A20 AIT003 FIRST PASS CONCENTRATE WATER LOW PH**

Alarm which indicates the intervention for concentrate water low pH (AIT003)

The plant stops in emergency.

When this signal appears, it is necessary to:

- ⇒ Check the correct operation and calibration of probe AE003.
- ⇒ Check the correct operation and calibration of instrument AIT003.
- ⇒ Check the flow rates and pressures correct setting.
- ⇒ Check the valve's correct operation.
- ⇒ Check the PD03 dosing pump correct operation.

### **13.2.21 A33 THERMAL PUMP P01**

Alarm which indicates the thermal shut down for one of the motors protection.

The plant stops in emergency .

When this signal appears, it is necessary to:

- ⇒ Check which thermal shut down and reset it .
- ⇒ Check the correct thermal setting .
- ⇒ Check the correct operation of the use related to the thermal.

### **13.2.22 A34 THERMAL DOSING PUMPS**

Alarm which indicates the thermal shut down for one of the motors protection .

The plant stops in emergency .

When this signal appears, it is necessary to:

- ⇒ Check which thermal shut down and reset it .
- ⇒ Check the correct thermal setting .
- ⇒ Check the correct operation of the use related to the thermal .

### **13.2.23 A35 THERMAL PUMP P02**

Alarm which indicates the thermal shut down for one of the motorw protection .

The plant stops in emergency .

When this signal appears, it is necessary to:

- ⇒ Check which thermal shut down and reset it .
- ⇒ Check the correct thermal setting .
- ⇒ Check the correct operation of the use related to the thermal .

### **13.2.24 A36 FAULT VFD P02**

Alarm which indicates the fault status of the P02's VFD.

The plant stops in emergency.

When this signal appears, it is necessary to:

- ⇒ Check the VFD correct settings.
- ⇒ Check the correct PID settings .
- ⇒ Check the correct operation of the pump.

### **13.2.25 A37 THERMAL PUMP P03**

Alarm which indicates the thermal shut down for one of the motors protection .

The plant stops in emergency .

When this signal appears, it is necessary to:

- ⇒ Check which thermal shut down and reset it.
- ⇒ Check the correct thermal setting.
- ⇒ Check the correct operation of the use related to the thermal.

### **13.2.26 A49 TIT002 SECOND PASS HIGH TEMPERATURE**

Alarm which indicates the intervention for inlet high temperature (TIT002)

The plant stops in emergency

When this signal appears, it is necessary to:

- ⇒ Check the correct operation of probe TIT002.
- ⇒ Check the cause of water's high temperature.

### **13.2.27 A50 SECOND PASS DELTA PRESSURE ALARM**

Alarm which indicates the intervention of the pressure set which causes the plant shut down for an high pressure delta in reverse osmosis modules.

The plant stops in emergency

When this signal appears, it is necessary to:

- ⇒ Check the flow rates and pressures' correct setting
- ⇒ Check the membranes' clogging degree and eventually execute a membranes chemical cleaning.

### **13.2.28 A51 SECOND PASS PERMEATE HIGH FLOW (FIT005)**

Alarm which indicates the intervention of FIT005 second pass high permeate flow set.

The plant stops in emergency

When this signal appears, it is necessary to:

- ⇒ Check the flow rates and pressures' correct setting
- ⇒ Check the P04 pump's correct operation
- ⇒ Check the membranes clogging degree and eventually execute a chemical cleaning.

### **13.2.29 A52 SECOND PASS PERMEATE LOW FLOW (FIT005)**

Alarm which indicates the intervention of FIT005 second pass low permeate flow set.

The plant stops in emergency

When this signal appears, it is necessary to:

- ⇒ Check the flow rates and pressures correct setting
- ⇒ Check the pump correct operation
- ⇒ Check the membranes clogging and eventually execute a chemical cleaning

### **13.2.30 A53 SECOND PASS CONCENTRATE HIGH FLOW (FIT006)**

Alarm which indicates the intervention of FIT006 second pass high concentrate flow set.

The plant stops in emergency

When this signal appears, it is necessary to:

- ⇒ Check the flow rates and pressures correct setting
- ⇒ Check the pump correct operation
- ⇒ Check the membranes clogging and eventually execute a chemical cleaning

### **13.2.31 A54 SECOND PASS CONCENTRATE LOW FLOW (FIT006)**

Alarm which indicates the intervention of FIT006 second pass low concentrate flow set.

The plant stops in emergency

When this signal appears, it is necessary to:

- ⇒ Check the flow rates and pressures correct setting
- ⇒ Check the pump correct operation
- ⇒ Check the membranes clogging and eventually execute a chemical cleaning

### **13.2.32 A55 SECOND PASS RECYCLE HIGH FLOW (FIT007)**

Alarm which indicates the intervention of FIT007 second pass high recycle flow set.

The plant stops in emergency

When this signal appears, it is necessary to:

- ⇒ Check the flow rates and pressures correct setting
- ⇒ Check the pump correct operation
- ⇒ Check the valve correct operation

### **13.2.33 A56 SECOND PASS RECYCLE LOW FLOW (FIT007)**

Alarm which indicates the intervention of FIT007 second pass low recycle flow set.

The plant stops in emergency

When this signal appears, it is necessary to:

- ⇒ Check the flow rates and pressures correct setting
- ⇒ Check the pump correct operation

- ⇒ Check the valve correct operation

### **13.2.34 A57 AIT004 SECOND PASS PERMEATE HIGH CONDUCTIVITY**

Alarm which indicates the intervention for permeate high conductivity

The plant stops in emergency.

When this signal appears, it is necessary to:

- ⇒ Check the operation and calibration of probe AE004
- ⇒ Check the operation of instrument AIT004
- ⇒ Check the flow rates and pressures correct setting
- ⇒ Check the membranes clogging and eventually execute a membranes chemical cleaning

### **13.2.35 A59 SECOND PASS SELECTOR NOT IN AUTOMATIC POSITION**

When this signal appears, it is necessary to:

- ⇒ Check the position of the automatic button

#### **NOTE**

The minimum configuration in order to start up the plant is :

#### **SECOND PASS**

Feed Valve 2AV05 in "AUTOMATIC"

High pressure pump P04 in "AUTOMATIC"

Concentrate control valve 2AV06 in "AUTOMATIC"

Permeate valve 2AV08 in "AUTOMATIC"

Permeate valve 2AV09 in "AUTOMATIC"

### **13.2.36 A60 PIT006 SECOND PASS MEMBRANE INLET HIGH PRESSURE**

Alarm which indicates the intervention of relevant set

The first pass stops in emergency

When this signal appears, it is necessary to:

- ⇒ Check the flow rates and pressures correct setting

- ⇒ Check the pump correct operation
- ⇒ Check the valve correct operation

### **13.2.37 A61 EMERGENCY**

Alarm which indicates the intervention emergency button

The system stops in emergency

When this signal appears, it is necessary to:

- ⇒ Check the position of the emergency button
- ⇒ Check the position of key selector

### **13.2.38 A62 PIT013 SECOND PASS PERMEATE HIGH PRESSURE**

Alarm which indicates the intervention of relevant set

The first pass stops in emergency,

When this signal appears, it is necessary to:

- ⇒ Check the flow rates and pressures correct setting
- ⇒ Check the pump correct operation
- ⇒ Check the valve correct operation

### **13.2.39 A81 THERMAL PUMP P04**

Alarm which indicates the thermal shut down for one of the motor protection .

The plant stops in emergency .

When this signal appears, it is necessary to:

- ⇒ Check which thermal shut down and reset it .
- ⇒ Check the correct thermal setting .
- ⇒ Check the correct operation of the use related to the thermal .

### **13.2.40 A82 FAULT VFD P04**

Alarm which indicates the fault status of the P04's VFD.

The plant stops in emergency.

When this signal appears, it is necessary to:

- ⇒ Check the VFD correct settings.
- ⇒ Check the correct PID settings .
- ⇒ Check the correct operation of the pump.

### 13.2.41 A83 THERMAL PUMP P03

Alarm which indicates the thermal shut down for one of the motor protection .

The plant stops in emergency .

When this signal appears, it is necessary to:

- ⇒ Check which thermal shut down and reset it .
- ⇒ Check the correct thermal setting .
- ⇒ Check the correct operation of the use related to the thermal.

## 14 RISK ANALYSIS

### 14.1 TYPE: Mechanical risk

**Description:** Risk of ejection of acid and alkaline fluids.

**Explanation:** Eventual contact with acid and alkaline liquids coming out from pipes.

- Must be protected: Environment
- Must be protected: People
- The risk is extended to: Many people
- Level of injury: Dependent from used chemicals
- Appearance rapidity Quick
- Exposition frequency : Low
- Possibility to avoid damage: Possible by employing skilled people

**Adopted measures:** The pressure lines are equipped with manometers and/or pressure switches which stop the pumps in case of sudden pressure loss.

The pipes are dimensioned for operation pressures much higher than those of real use.

All pipes are equipped with special valves for the drain, properly installed in order to facilitate the maintenance operation and increase the safety of operators from accidental contact with transferred fluids.

#### 14.2 TYPE: Danger caused from materials and substances used in machines

**Description:** Danger of contact or inhalation of dangerous fluids, fogs, smokes or powders.

**Explanation:** Inhalation and / or diffusion in the ambient of acid or caustic steam.

- Must be protected: Environment
- Must be protected: People
- The risk is extended to: Many people
- Level of injury: Dependent from used chemicals
- Appearance rapidity: Slow
- Exposition frequency: Medium
- Possibility to avoid damage: Possible by employing skilled persons

**Adopted measures:** Drainage pipes for plant emptying in case of maintenance intervention.

#### 14.3 TYPE: Danger caused by failure of ergonomic principles

**Description:** Failure in use of personal protection devices .

**Explanation:** The process include the use of acid and caustic substances

- Must be protected : Environment
- Must be protected : People
- The risk is extended to : Many people
- Level of injury: Dependent from used chemicals
- Appearance rapidity Quick
- Exposition frequency : Low
- Possibility to avoid damage: Possible by employing skilled people

**Adopted measures :** Shut down button in emergency installed visible and accessible to the operator in normal operation conditions .

Frequent reminds to the use of DPI and suitable devices and protection materials indicated in USE AND MAINTENANCE MANUAL.

The devices can be operated one by one with manual control installed near them and so immediately attainable from the operator

#### 14.4 TYPE: Electrical hazard

**Description:** danger of contact of persons with live parts (direct contact).

**Explain:** contact with live parts.

- Must be protected: People
- Must be protected: People
- The risk is extended to: A person

- Level of injury: Serious and irreversible
- Speed appearance: Quick
- Frequency exposition: Low
- Ability to avoid the damage: Possible by employing skilled people

**Measures taken:** The electrical system is certified by the manufacturer and complies with the safety standards in relation to the protections to workers.

Only qualified personnel are authorized to act on parts electrically connected.

#### 14.5 TYPE: Danger of accidental starting

**Description:** Danger of a fault / malfunction of the control system.

**Explain:** Any accidentally starting a device during maintenance.

- Must be protected: People
- Must be protected: People
- The risk is extended to: A person
- Level of injury: Serious and irreversible
- Speed appearance: Quick
- Frequency exposition: Low
- Ability to avoid the damage: Possible by employing skilled people

**Measures taken:** All maintenance operations are subject to special security measures, and in any case are provided only when the system is stopped , or by the local control board is not powered.

#### 14.6 TYPE: danger linked to the working position

**Description:** Danger of noise at the workplace.

**Explain:** Excessive noise in the workplace.

- Must be protected: Environment
- Must be protected: People
- The risk is extended to: Many people
- Level of injury: Reversible
- Speed appearance: Slow
- Frequency exposition: High
- Ability to avoid the damage: Possible by employing skilled people

**Measures taken:** The machines that make noise as part of the installation under analysis, have been tested and certified in accordance with rules.

## 14.7 TYPE: Mechanical danger and dangerous events

**Description:** Danger from faults assembly / testing / use / maintenance.

**Explain:** Malfunctions or anomalies to incorrect installation or assembly of parts.

- Must be protected: Environment
- Must be protected: People
- The risk is extended to: Many people
- Level of injury: Serious and irreversible
- Speed appearance: Quick
- Frequency exposition: Low
- Ability to avoid the damage: Possible by employing skilled people

**Measures taken:** Each device under routine or extraordinary maintenance is provided with the maintenance booklet made available to the personnel who must be educated about the dangers mentioned above.

## 15 ADDITIONAL INSTRUCTIONS

### 15.1 WASTE DISPOSAL

It is the responsibility of the user, according to the laws in force in his country, check the proper disposal of waste that the plant produces during processing.

The disposal of replaced parts must be performed in accordance with the legislation in force in the country where the unit is operated

### 15.2 DECOMMISSIONING AND DISMANTLING

When dismantling is necessary to separate the plastic parts and electrical components, which must be sent to waste collection in accordance with the legislation in force.

As regards the metallic mass of the unit, it is sufficient to share the steel parts and those of other metals or alloys, for proper recycling by melting

### 15.3 SAFETY WORKS PROCEDURE

Arrange for the specific procedures and adequately inform the operators for :

- Safe use of the unit
- Emergency situations

## 16 ADVISED MATERIAL IN STOCK

DESCRIPTION	COD.	N°
CLEANER A1 ACID DETERGENT PRODUCT		50 kg
CLEANER B1 ALKALINE DETERGENT PRODUCT		50 kg
Servocontrol Compact		1
Filter closure gasket CF01		1
Vessel end cap gaskets		2
PVC union o-rings set		1

## 17 CONSUMABLES

### 17.1 RO DOUBLE PASS 8000 44 8

DESCRIPTION	COD.	Q.TY
Filtering cartridges 20" 5 MCR	702000008	15

## **18 ANNEX**

### **18.1 LAY - OUT**

### **18.2 P & ID**

### **18.3 WIRING DIAGRAM**

### **18.4 VARIABLE FREQUENCY DRIVER INSTRUCTION MANUAL**

### **18.5 ANALISYS INSTRUMENTS MANUAL**

### **18.6 GRUNDFOS PUMP MANUAL**

### **18.7 DOSING PUMP MANUAL**

### **18.8 FLOW SENSOR MANUAL**

### **18.9 CONCENTRATE AUTOMATIC VALVE MANUAL**

### **18.10 CERTIFICATE OF CONFORMITY**